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ABSTRACT

The writers of this paper draw on their own research efforts and an extensive review of the literature related to prediction of delinquency (and the related factors of personal and social adjustment, health problems, welfare status, and academic underachievement) to point out a number of deficiencies and difficulties encountered in research efforts in this area. Specific discussions are included on the need for longitudinal studies, single predictors vs. multiple predictors, adequacy of criteria of delinquency, the basis of predictor selection, the contribution of a new predictor, the prediction of individual delinquency, and sophisticated statistics and delinquency prediction. Related documents are ED 019 153 and RC 004 259. (DK)

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Problems of Prediction of Delinquency and Related Conditions Over a Seven Year Period[1]

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The main purpose of this paper is to identify some major shortcomings and errors of previous research on the prediction of delinquency and the related conditions of personal and social adjustment, health problems, welfare contacts, and achievement in school. Alternative approaches to research in this area will be suggested. A further purpose is to describe some of the research activities of the Eau Claire County Youth Study which were undertaken to respond to some of the research problems commonly associated with these areas of investigation.

All of the areas of prediction with which we are concerned - delinquency, personal and social adjustment, health problems, welfare contacts, and school underachievement - have generated a large body of research. Much or most of the research is not academically or theoretically inspired but seems instead to exhibit a concern with solutions to the social problems represented. Of course, delinquency is a problem which is growing so rapidly that there is an inevitable immediacy to the practical concern. Yet it seems that research results in their application have not been too helpful. Social problems have grown by leaps and bounds.

We have been reviewing the literature of delinquency and related problem areas since 1959. This effort has involved the examination of thousands of references. From this review and from our own research efforts in this area during the 60's, we have drawn some conclusions about methodological problems in this field. We hasten to point out that in our own research we have committed some of the errors which we will enumerate.

We begin by acknowledging that a number of writers have already discussed deficiencies in delinquency research. A thorough and reasonably up-to-date summary and extension of these criticisms appears in the book Delinquency Research by Travis Hirschi and Hanan C. Selvin published by the Free Press

in 1967. Methodological problems in delinquency research were also pointed out in the report of the President's Commission on Law Enforcement and Administration of Justice, The Challenge of Crime In A Free Society, 1967, and the report of the Task Force on Juvenile Delinquency, Juvenile Delinquency and Youth Crime, also 1967. A number of texts in this field have also commented on some of the problems we will present (Quay, 1965; Kvaraceus, 1966, National Society for the Study of Education, 1966). Rose's review (1967) of problems in the early identification of delinquents has also highlighted problems in this area of research.

The Need for Longitudinal Studies

The first problem which we shall note in this field of research is the paucity of true longitudinal studies. Concurrent and cross-sectional studies in which data on predictor "causes" and "effects" or "outcomes" are gathered simultaneously, are the usual approaches. These methods provide no empirical way of ascertaining the course or process of cause and effect. While the longitudinal study may sometimes leave some doubt, it probably warrants stronger conclusions of causality when the data involving prediction and cause are gathered some time before the criterion data involving "outcome".

In the Eau Claire County Youth Study we made a large number of behavioral observations on 1550 children in 1961 and 1962. Concurrent and cross-sectional results of our work for third, sixth and ninth graders were reported in 1964 (Thurston, Feldhusen and Benning). Our predictors of problem behavior then were the Glueck Delinquency Prediction tables (Glueck and Glueck, 1959), KD Proneness Scale scores (Kvaraceus, 1950), ratings derived from delinquency prediction scales developed in the Flint Youth Study (Flint Youth Study, 1959), several psychological tests which we developed, and extensive data derived from interviews with the children and their parents. Our criterion of problem

behavior was teacher's nomination of the children as persistently aggressive and disruptive in the classroom. Our review of the literature indicated that this should be an effective predictor of eventual delinquency.

In the subsequent Phase II (Feldhusen, Thurston and Benning, 1965) and Phase III (Benning, Feldhusen and Thurston, 1968) we began longitudinal analyses by relating our prediction data gathered in 1961 and 1962 to problem behavior which occurred several years later in the form of police contacts, academic underachievement, and poor social adjustment.

Single Predictors vs. Multiple Predictors

A second major problem generally noted in delinquency research involves the analysis of predictor variables one at a time, with no provision for assessment of interrelationships among predictors. Analyses of variance, "t" tests, and simple correlations have been the statistical procedures usually employed. In these analyses one predictor is examined in relation to one criterion variable at a time. Since many modern researchers have both multiple predictors and criteria, the number of statistical tests to be run is little short of overwhelming. All of this represents antiquated, and surely questionable statistical methodology. In our first technical report in 1964, we had several hundred separate ANOVAS and chi squares. It has been our experience that findings presented in this fashion are not easily nor usefully interpreted.

Adequacy of Criteria of Delinquency

A third problem involves criteria. What measures will you use to assess and represent the problem or problems with which you are concerned? There has been much discussion and research on the criterion problem in delinquency research. In The Measurement of Delinquency, Sellin and Wolfgang (1964)

reviewed the problem and provided some empirical evidence. The delinquency researcher is faced with choosing from a number of potential delinquency criteria, the one or several that he feels will be most adequate for his purposes.

As our delinquency index in Phase I of our research we chose teacher nominations of classroom behavior as either consistently approved or disapproved. In Phases II and III, 1964-1968, our criteria of delinquency became appearance on police or sheriff records, classroom behavior of students as observed by teachers, personal and social adjustment as rated by teachers, and standardized academic achievement test scores. In general, all of our criterion assessments after the initial interviews in 1961 and 1962 have been unobtrusive measures of the type proposed by Webb, Campbell, Schwartz, and Sechrest (1966).

The Basis of Predictor Selection

Closely related to the problems of criteria are problems of selecting predictors. If one operates from a base of explicit and comprehensive behavioral theory, which is not common in delinquency research, the selection of predictors should be dictated by this theory. Most researchers operate eclectically and perhaps too intuitively on the basis of their experiences or knowledge of previous research and instrumentation. This leads, as we see it, to an overreliance on psychological assessments for delinquency predictors and a neglect of direct behavioral observations. Bloom (1964) has presented empirical evidence that the best predictors of a behavior will be prior assessments of the same or closely related behaviors. In this respect, then, the KD Proneness Checklist, a tool for the systematic observation of a child's behavior by a teacher, should prove to be a better

predictor of social behavior than the KD Proneness Scale which is a psychological assessment of the child's attitudes as expressed by the child. One of the current authors has argued (Eigen and Feldhusen, 1964) that it will frequently be desirable to seek academic predictors which are as similar to the academic criterion as possible. We believe that the concept is equally applicable in delinquency prediction research.

The Contribution of a New Predictor

A truly comprehensive survey of research in this field requires considerable effort. Consequently too many researchers develop prediction instruments as though they were the first to undertake the prediction problem. That is, researcher X finds or develops a test, selects a criterion, draws a sample, and asks, "Will my test predict delinquency?" This is the characteristic approach in too much delinquency research. It is like inventing the wheel over and over. Many instruments have been found to be predictive of delinquency. Thus, a critical question is, "What does this new test or measure add to our prediction power?" The new test might correlate .40 with a delinquency criterion but if its variance overlaps substantially with the prediction variance already contributed by the KD Proneness Scale, for example, we have perhaps gained little. Herbert Conrad commented on this problem in 1950. His views have been largely ignored.

In the Eau Claire County Youth Study, we assembled a battery of known or theoretically good predictors. But we did not, in Phase I, synthesize our predictors in a way that would permit testing the contribution of a new predictor as part of a set of established predictors. In Phase II we began to use multiple regression analysis. In our current Phase IV we will turn still more in this direction. Diagrammatically, the problem is this (See Figure 1). Situation A shows the ideal approach in which we ask if new

test X builds our prediction power higher than we already are able to predict. Situation B, undesirable, merely asks "Can we do better than zero?"

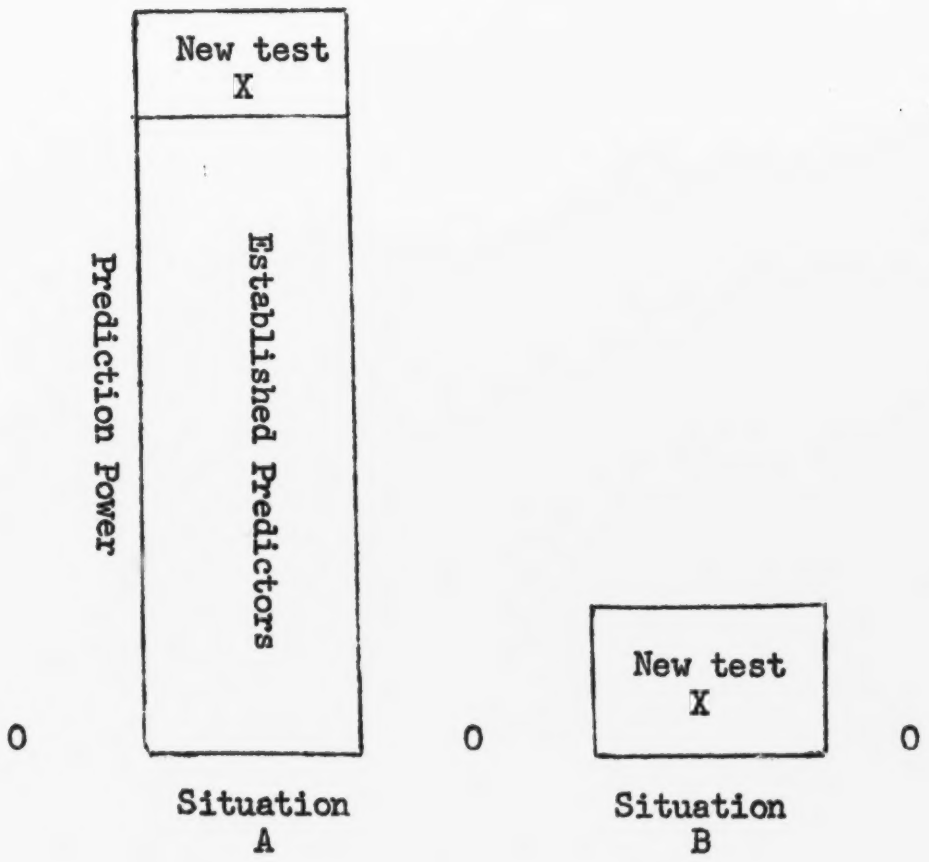
Prediction of Individual Delinquency

The next problem we shall discuss is the lack of true longitudinal prediction, person by person, in delinquency research. For a majority of researchers, prediction does not mean prediction of the eventual behavior of individuals. The effort stops far short, usually with the sample mean, standard deviation, "t" test or the ANOVA. But the question should be perhaps, "What do you predict for this new bunch of kids I place before you, and specifically what do you predict for Roger, John, Norman, Marian, Wilma, or Henry? In short we are saying that prediction research should be carried through to the point of making specific predictions involving individuals, and then we should watch to see if the predictions come true. Research techniques to make such specific predictions, have been available for a long time. Yet they are only rarely used by delinquency researchers. The Eau Claire County Youth Study, a continuous longitudinal effort since 1960, has provided us with evidence regarding the problems and potentialities involving these procedures.

Sophisticated Statistics and Delinquency Prediction

Several problems involving delinquency could be resolved through use of complex statistical procedures such as multiple regression analysis, multiple discriminant function analysis, principal components analysis, and canonical factor analysis. In general, we suggest that there is a major problem in delinquency prediction research in the failure of researchers to use some of these advanced techniques for data reduction and analysis. Most of the problems we have talked about so far can be solved only by moving to these relatively newer techniques. We say "newer" while recognizing that all of

Figure 1


New test
X
Established Predictors
Prediction Power
O
Situation
A
O
New test
X
O
Situation
B

the techniques have been around for a long time.

a. Multiple Regression Analysis

The first and foremost advantage of all four of the statistical techniques named above is that of being able to combine and assess the power of a number of predictors. If tests B, C, D, E, F, and G are all individually correlated with the delinquency criterion Z, then multiple regression analysis makes it possible to combine their predictive power. Simultaneously we can determine if each test is an effective predictor, or if several tests have so much overlapping variance that they make no independent contribution to the prediction. Using step-wise programs we can also assess the relative power of each predictor and can readily search for the most effective and manageable prediction battery. Multiple regression analysis also yields the necessary coefficients for building the prediction equation which can be applied, person by person, to a new sample. Sawyer (1966) has shown that such synthesis of data as is afforded by multiple correlation analysis and other multivariate procedures, yields much more effective prediction than results when a skilled judge looks at a number of variables and makes person-by-person predictions subjectively.

b. Multiple Discriminant Function Analysis

Closely related is the failure of delinquency researchers to use the statistical approaches which would often be appropriate where the criterion in the research design might be trichotomous. For example, the criterion might be delinquency exhibited as aggressive behavior in school, delinquency as official law contacts, and delinquency as court adjudication. For such a situation, multiple discriminant function analysis is appropriate.

Now, what do you predict with discriminant function analysis? You

predict group membership. Will Joel become a member of the school delinquency group, the law contact group, or the court adjudicated groups? When group membership is natural, and not the product of some arbitrary categorization of a continuous variable, the discriminant function analysis is particularly appropriate.

Kelly, Veldman, and McGuire (1964) reported an interesting use of discriminant function analysis for the prediction of school dropouts and delinquency. The model illustrated is of considerable research interest, even though they had minimal success in the efficiency of their predictions.

In the current Phase IV of the Eau Claire County Youth Study, we are using both multiple regression analysis for prediction of academic achievement and discriminant function analysis for delinquency predictions. In both, we are using stepwise programs which permit us to assess the power of individual predictors and to assemble the most parsimonious and thus manageable prediction batteries.

c. Principal Components Analysis

There are numerous situations in which the interrelationships among predictors should be investigated not merely to determine overlapping variance, but as a way to identify behavioral or psychological constructs common to combinations of predictors. Thus, for example, among 27 predictors of delinquency, 5 may be (1) the child's responses to an attitude scale, (2) the father's occupation, (3) the mother's education level, (4) the child's subscore on a community attitudes scale, and (5) the child's self concept relating to social activities. In these, there may be a common factor which might be called a socioeconomic variable. Whereas the researcher thinks he has 5 single measures, he may be able to consider these together

usefully as a major construct, a socioeconomic one. To detect this combination of variables he probably would have to conduct a principal components or factor analysis of his predictors.

In Phase IV we did such analyses for the first time, among our predictors. The principal components analysis is also being used with our current prediction battery.

d. Canonical Factor Analysis

Closely related to the principal components analysis is the canonical factor analysis which we have not seen used in delinquency research and which we ourselves have not yet used in the area of delinquency research. However, we have used it in other areas of our research (Pollert, Feldhusen, Van Mondfrans, and Treffinger, 1969).

We will describe the nature of the problem in which the canonical correlation seems appropriate. Assume that you have 25 delinquency predictors and 10 delinquency criterial assessments. Now we might ask the question, "Is there a group of predictors and criteria which cluster together in a unique relationship?" Thus, predictors numbered 7, 11, 14, 19, 20 and 21 of the 25 might be uniquely associated with criteria numbered 4, 7 and 9. This is in essence a factor analysis across predictors and multiple criteria.

The canonical correlation is uniquely useful in situations of multiple criteria and where a factor analysis across predictors and criteria will increase prediction power by identifying a set of originally discrete predictor variables which are found to be all related to one or several constructs of delinquency.

Realizing that our discussion of these statistical methods is of necessity brief and therefore incomplete, we would like to suggest some

readings. For an extended discussion of multiple regression and discriminant function analysis procedures the book Multivariate Procedures for the Behavioral Sciences by Cooley and Lohnes (1962), is a good reference. For a discussion of factor and principal components analysis see Lawley and Maxwell's Factor Analysis As a Statistical Method (1963). For discussion of canonical correlations and canonical factor analysis see an article by Rao in Psychometrika (1955) and Morrison's text Multivariate Statistical Methods (1967).

Research on the prediction of delinquency and related behavior problems can be improved immensely if we can get many researchers to step out of the horse-and-buggy age of calculators and t tests into the space age of computers and multivariate analyses. The ideas we have been championing will absolutely require the use of the computer because the calculations are so complex and extensive. Hopefully, through the use of these methods and tools we can develop more accurate predictions of behavior problems. Then we can with greater assurance tackle the ultimate problem; the prevention of delinquent behaviors.

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